The need for effective on-farm irrigation water management in Nigeria
ナイジェリアにおける効率的な圃場水管理の必要性

○Muhammad ZaharaddeenDayyabu[1], Katsuyuki Shimizu[2], and Yumi Yoshioka[2]
○ムハマドザハラディーンダヤブ[1]　清水克之[2]　吉岡有美[2]

1. Background and objectives

Food security is inextricably linked with water security. Irrigation is recognized as a means to substantially increase agricultural productivity and improve food security. However, Food Agriculture Organization (FAO) indicated that 75% of the future agricultural growth is required in Nigeria by 2030 which will have to come from intensification (yield increases and higher cropping intensities), with the remaining 25% coming from arable land expansion (FAO, 2000). This will probably have to be achieved with less water use, especially as agriculture is the major user of water, accounting for about 50% of the country water resources (Sanyu Consultants Inc., 2013). Accordingly, if irrigated agriculture is aggressively promoted and expanded, so a need for proper on-farm water management of the available water resources is required in dealing with the potential alarming problem of water shortage because of the climate change. In this paper the problem of water shortage in one of the highest water demand hydrological area (HA-8) is reviewed, which its sources of surface water is the KomaduguYobe River Basin (KYB).

2. The current vision on Nigerian water resources development

The 2010 vision 2020 sets the overarching long-term development framework for Nigeria. It is designed to push the country to achieve socio-economic development status of the top 20 countries in the world thus enabling the country attain a high standard of living for its citizens (NPC, 2011). The vision envisages increase investment in agriculture, industry and manufacturing and expansion of the infrastructure. The Water Resources Act of 2004 is the highest existing legislation governing water resources management in Nigeria. It confers on the Federal Ministry of Water Resources (FMWR) the responsibility for controlling the use of surface and groundwater resources in Nigeria. The Act represents the contemporary approach on water resources development, conservation, allocation and use that aims to optimise and sustain social, economic and environmental needs based on the integrated water resources management (IWRM) approach.

3. Water resources demand projection

The total water demand in Nigeria is estimated at 5.93 BCM/year (2010). It is expected to increase to 16.58 BCM/year in 2030.The share of irrigation water demand will increase from about 30% in 2010 to about 40% in 2030 under minimal utilization of the water uses in each sector. Also the demand is categorised by sources in each of the eight hydrological areas (HA) of the country. The current surface water demand of 0.82 BCM/year (2010) in HA-8 will increase to 1.61 BCM/year in 2030 making it the hydrological area with the highest demand of surface water, the water is mostly used for irrigation of large scale irrigation schemes in the area. In HA-8, the total generated runoff is estimated at 7.22 BCM/year. However, only 1.57 BCM/year reaches to the outlet of HA-8 that is Lake Chad, due to large amount of loss in the large wetland area along the river in the KYB, this causes the deficit and conflict in water resources in the area, which comprises of six riparian federal states namely Bauchi, Borno and Yobe in the North East,

[1]Graduate School of Agriculture, Tottori University 鳥取大学大学院農学研究科
[2]Faculty of Agriculture, Tottori University 鳥取大学農学部
Keywords: Food security, Arable land, Water management, Hydrological area, Nigeria, Water deficit

Jigawa and Kano in the North West and Plateau in the North Centre. Kano River Irrigation Projects (KRIP), Hadejia Valley Irrigation Project (HVIP) and municipal water supply are the main user of the available water resourcesin the area(Oyebande, 2001).

4. Increasing challenges on the available water resources

4.1 Water shortage

The freshwater shortages have increased the potential for upstream/ downstream conflict. In the KYB disputes between the downstream riparian states of Borno and Yobe state (Nigeria) were fuelled by the lack of adequate water for their needs. They blamed this on the upstream states that they accused of storing all the water from the Tiga and Challawa Gorge dams for KRIP and HVIP, and releasing too little for downstream users (Oyebande, 2001). Recently there has been pro-active opposition from the downstream states of Yobe and Borno to the construction of the Kafin Zaki Dam (proposed) on the Jama'are River (IUCN, 2003).

4.2 High population growth in the region

Significantly enlarged population will depend on the basin's limited water resources for their survival, the total population of the six states was estimated to be about 31 million people (2010 NPC). The KYB supports a population of over 20 million people who are critically and increasingly dependent on its scarce water resources for domestic supplies and agricultural, fishing, livestock production. Kano city and other major urban and rural settlements make further demand on the water resources for urban and rural needs. This also promotes the water conflict among the competitive states.

4.3 Water resources development projects

The basin has two large dams, the Tiga and Challawa Gorge dams with a combined storage capacity of 2.2 BCM which deliver water for irrigation of 20,000 ha and serve as source of water supply to Kano state and other communities. The water requirements in the Hadejia River Basin are already at times exceeding the available water resources and are at a critical point where further expansion of requirements of one use will deprive other users of water. IUCN study estimated that the potential water requirements are at least (not taking into account evaporation losses) 2.6 times greater than the mean surface water resources. If the construction of the Kafin Zaki Dam (proposed) is completed for the proposed Jama'are Valley Irrigation Projects and some smaller irrigation in upstream of Katagum, potential water requirements for the Jama'are River Basin could be more than 1.8 times the available water resources in a mean year (Bdilaya et al. 1999).

5. Future outlook

The need for full utilization and management of on-farm water use for the large and small scale irrigation schemes(KRIP and HVIP) and others uses should be considered to avoid the conflict of the water users in the upstream and downstream of KYB, which have predicts that the magnitude of freshwater shortage is to become increasing by the year 2020 (Sanyu, 2013).

References:

Adeniji, H. A. (1975),"Arid Zone Hydrology and Water Resources, Ibadan, Nigeria", pp. 89-98.

IUCN (2003), "Hadejia-Nguru Wetlands Conservation Project", the World Conservation Union: Nigeria

L. Oyebande (2001) "Water Problems in Africa-How Can Sciences Help," Hydrological Sciences Journal, Vol. 46, No. 6, pp. 947-961.

NPC (2011), "National Planning Commission, 17th Nigeria economic summit",(Nigeria 20-2020) report.

Sanyu Consultants Inc. (2013), "National Water Resources Master Plan of Nigeria2014" Vol. 4, pp. 4-18

Sobowale et al. (2010) "Water Resources Potentials of Hadejia River Sub-Catchment of KomaduguYobe River Basin, Nigeria" Agricultural Engineering International: Vol. XII, p. 1065.